Date: June 18, 2015

To: Sonnie T. Pineda

From: S. A. Reid

Subject: Responses to Follow-up Comments Regarding Deeper Zone Disposal of Elk Hills Power Plant Wastewater

Sonnie,

Noted below are responses to follow-up comments received on June 9 from Ms Michele Dermer of the US EPA regarding deeper zone disposal of Elk Hills Power Plant wastewater.

Comment 1. It seems that the study focused only on the deeper formations at the same location as the proposed new wells, but it did not speak to the formations at the location of the currently operating wells, if they were to be deepened. Is there something that could be said about that?

Response: Only one of the current wells has a casing size with a large enough diameter to consider deepening to other stratigraphic intervals. Additional wells would need to be new boreholes. Wells will have additional cost because of the deeper drill depths - all lower stratigraphic intervals are 1200 to 1900 feet deeper (drill depth) in the 18G area than in the 1B-2B area.

At the 18G area of the structure there are no known hydrocarbon-producing intervals present. In general, a thicker overburden interval results in decreased porosity and permeability of all sand intervals as compared to areas shallower on the Elk Hills structure. In addition, water-filled zones are at or near original formation pressures. As a result, per well injectivity rates are likely to be less than those provided in the June 8 correspondence, and may result in additional wells required to dispose of wastewater. At a minimum, larger pumps would be necessary for injection into deeper and higher pressured intervals.

Sand-bearing intervals of one of the zones examined in the June 8 correspondence, the Eastern Shallow Oil Zone (ESOZ), are absent in the 18G area. In addition, zones deeper than the ESOZ have not been penetrated in the 18G area, and the character of the Western Shallow Oil Zone and Monterey Formation is unknown.

Comment 2. , I don't see anything about the deeper formations and whether any of them they may be considered a USDW like the Tulare Formation.

Response: All zones below the Tulare have salinity higher than 10,000 ppm TDS (DOGGR, "California Oil and Gas Fields"). Salinities listed below are ppm TDS.

San Joaquin – 37,300
ESOZ – 33,400
WSOZ – 32,300
Stevens (Monterey) – 22,000 to 29,000

Please let me know if you have any questions on the material presented here.

S. A. Reid

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